



Response of snow-dependent hydrologic extremes to continued global warming

Author(s): Diffenbaugh NS, Scherer M, Ashfaq M
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Abstract:

Snow accumulation is critical for water availability in the Northern Hemisphere(1,2), raising concern that global warming could have important impacts on natural and human systems in snow-dependent regions(1,3). Although regional hydrologic changes have been observed (for example, refs 1,3-5), the time of emergence of extreme changes in snow accumulation and melt remains a key unknown for assessing climate-change impacts(3,6,7). We find that the CMIP5 global climate model ensemble exhibits an imminent shift towards low snow years in the Northern Hemisphere, with areas of western North America, northeastern Europe and the Greater Himalaya showing the strongest emergence during the near-term decades and at 2 degrees C global warming. The occurrence of extremely low snow years becomes widespread by the late twenty-first century, as do the occurrences of extremely high early-season snowmelt and runoff (implying increasing flood risk), and extremely low late-season snowmelt and runoff (implying increasing water stress). Our results suggest that many snow-dependent regions of the Northern Hemisphere are likely to experience increasing stress from low snow years within the next three decades, and from extreme changes in snow-dominated water resources if global warming exceeds 2 degrees C above the pre-industrial baseline.

Source: <http://www.nature.com/nclimate/journal/v3/n4/full/nclimate1732.html>

Resource Description

Climate Scenario :

specification of climate scenario (set of assumptions about future states related to climate)

Representative Concentration Pathway (RCP)

Representative Concentration Pathway (RCP) : RCP 8.5

Exposure :

weather or climate related pathway by which climate change affects health

Extreme Weather Event, Food/Water Security, Temperature

Extreme Weather Event: Flooding

Temperature: Fluctuations

Geographic Feature:

Climate Change and Human Health Literature Portal



resource focuses on specific type of geography

Freshwater

Geographic Location:

resource focuses on specific location

Global or Unspecified

Health Impact:

specification of health effect or disease related to climate change exposure

Health Outcome Unspecified

Model/Methodology:

type of model used or methodology development is a focus of resource

Exposure Change Prediction

Resource Type:

format or standard characteristic of resource

Research Article

Timescale:

time period studied

Long-Term (>50 years)

Vulnerability/Impact Assessment:

resource focus on process of identifying, quantifying, and prioritizing vulnerabilities in a system

A focus of content